

Dec. 7, 1965

F. W. ROBSON ET AL  
DISHWASHING MACHINES

3,221,754

Original Filed Dec. 5, 1962

4 Sheets-Sheet 1

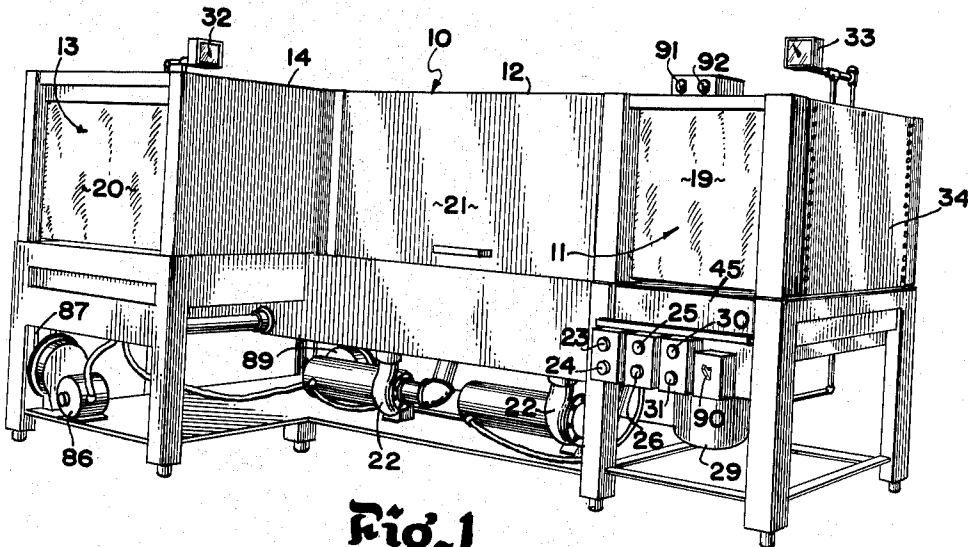


Fig. 1

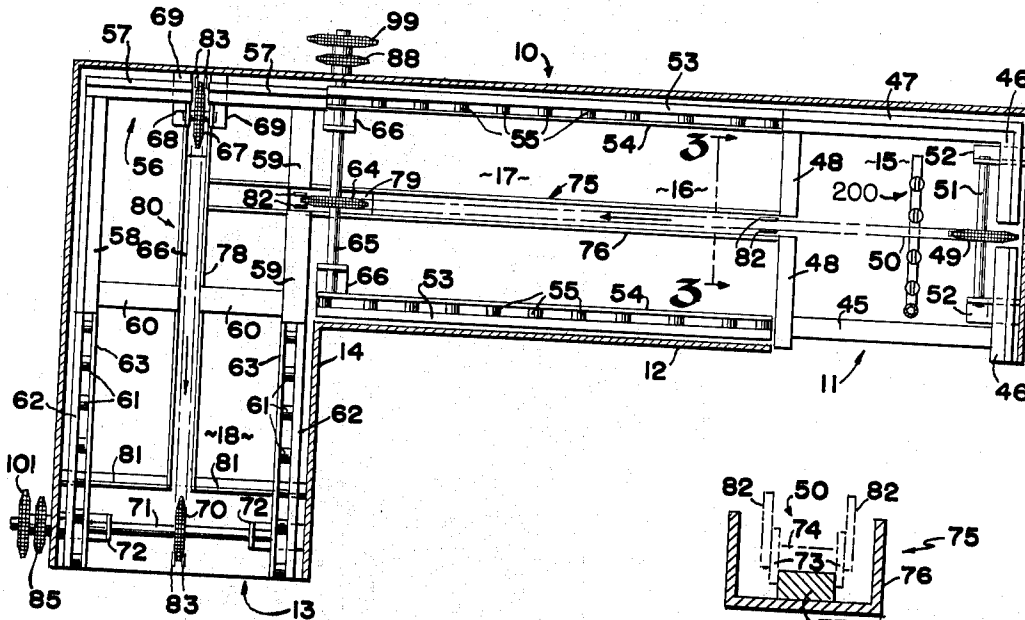


Fig. 2

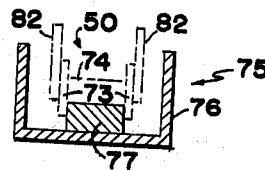


Fig. 3

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Fig. 4

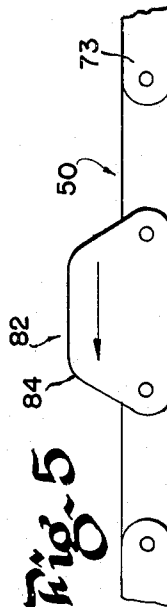
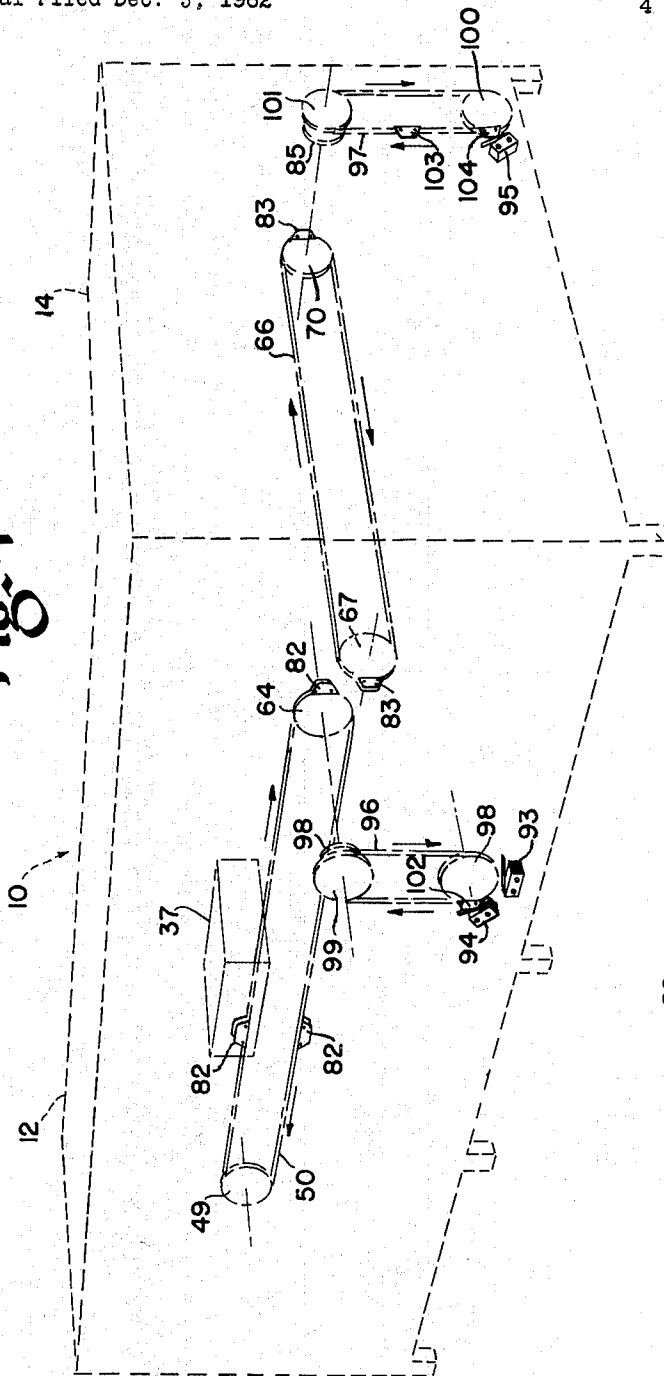


Fig. 5

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## DISHWASHING MACHINES

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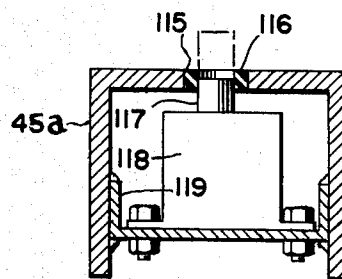
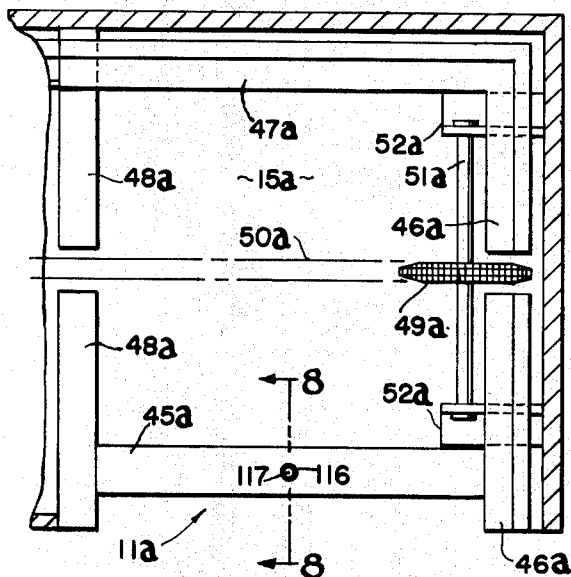
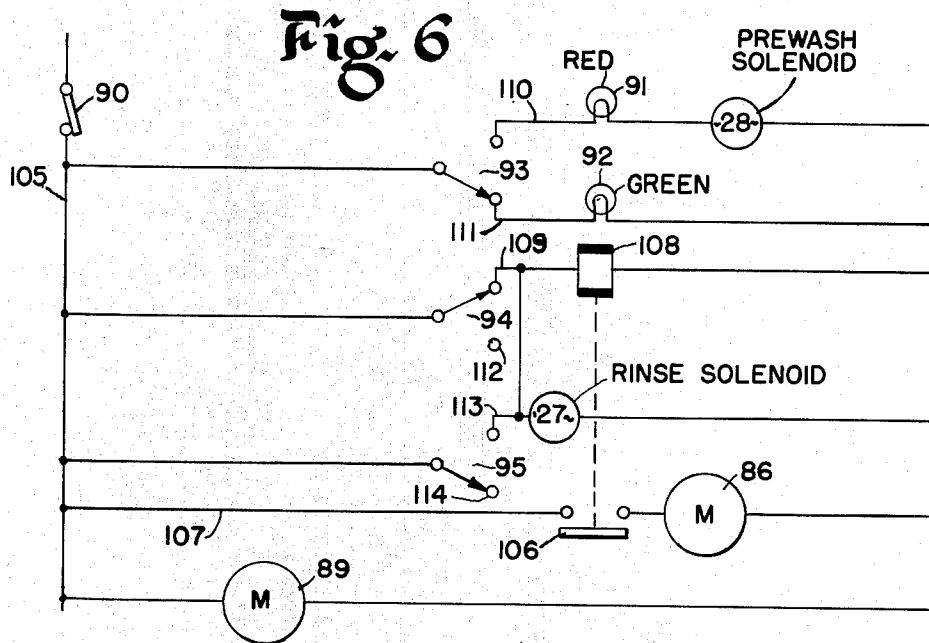


Fig. 8

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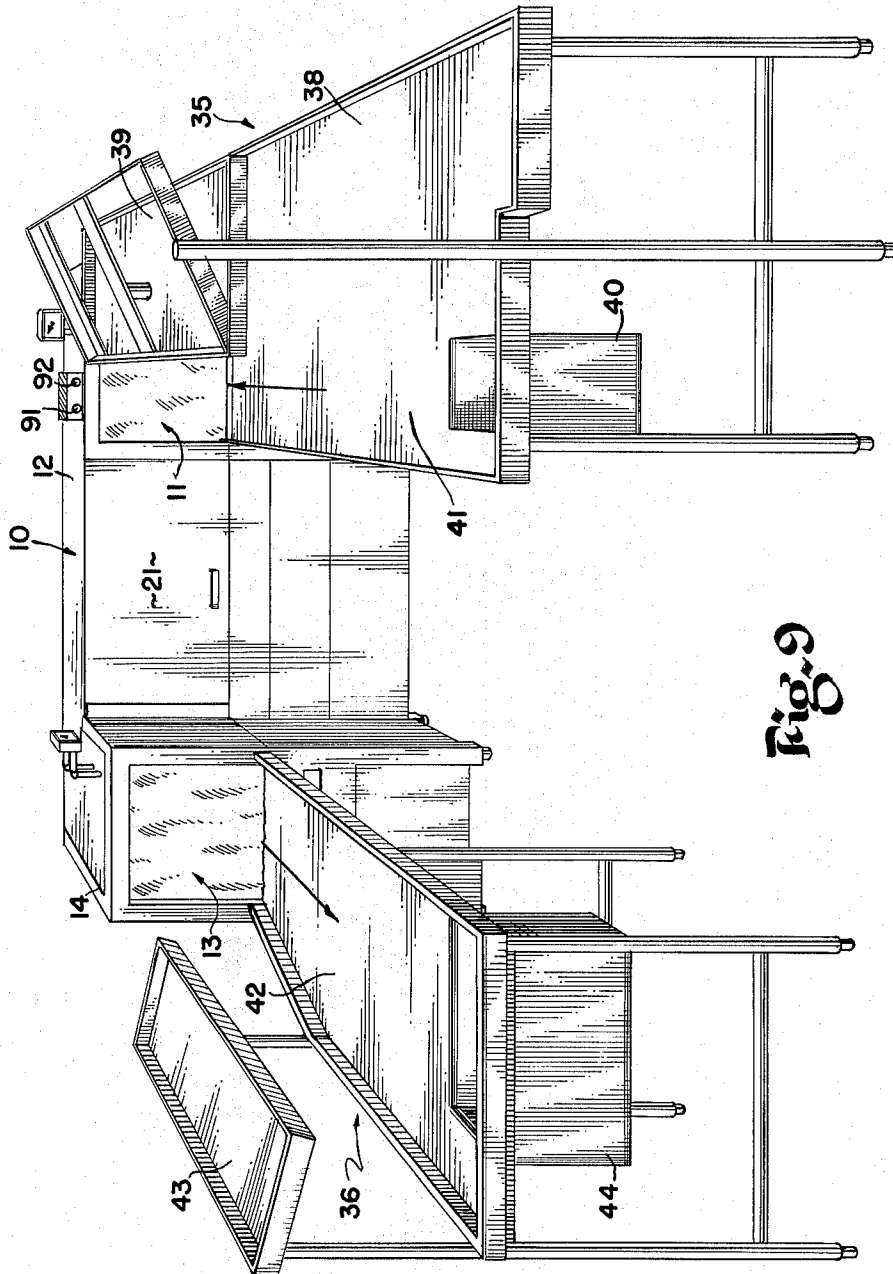
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## DISHWASHING MACHINES

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Figure

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3,221,754

## DISHWASHING MACHINES

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Continuation of application Ser. No. 242,536, Dec. 5, 1962. This application Sept. 28, 1964, Ser. No. 402,686  
4 Claims. (Cl. 134—68)

This application is a continuation of U.S. application Serial No. 242,536 filed December 5, 1962, now abandoned in names of Frederick W. Robson and William A. Wahl.

This invention relates to conveyor dishwashing machines.

The principal object of this invention is to arrange conveyor dishwashing apparatus to so complement two dish tables that the path of travel of dishes to, through and from the apparatus is in the shape of a U.

Another object of the invention is to so arrange the above apparatus that dish racks are fed into the apparatus from one of the tables and out of the apparatus onto the other table without need for an operator to lift the racks into or out of the apparatus.

Still another object is to provide an L-shaped conveyor dishwashing machine which can be operated by one man standing between tables in front of the machine.

A further object is to provide the above L-shaped machine with means for converting it from a front fed and unloaded machine to an end fed and front unloaded machine.

Another object is to provide an improved conveyor system for dishwashing machines.

Still another object is to provide, in a dishwashing machine, two conveyors, one for carrying dishes partly through the machine and the other for carrying dishes through the rest of the machine and out of the machine, and an automatic timing system for keeping such conveyors in synchronism.

A further object is to provide, in a dishwashing machine, a timing system for a continuously running conveyor and an intermittently running conveyor which is remotely located relative to the conveyors.

Another object is to provide an automatically operated, L-shaped conveyor dishwashing machine.

Still another object is to provide, in a dishwashing machine, two conveyors at right angles to each other with automatic transfer therebetween.

A still further object is to provide improved automatic control systems for dishwashing machines.

Another object is to make conveyor dishwashing machines more convenient for the operators to use.

One embodiment of this invention enabling the realization of these objects is an L-shaped conveyor dishwashing machine which can be operated by one man standing between tables in front of the machine, the path of travel of dishes to, through and from the machine being in the shape of a U. Two conveyors are provided at right angles to each other one in each leg of the L-shaped machine to carry racks of dishes through the machine. The operator feeds racks of dishes from the front of the machine to a continuously running one of the conveyors which carries the racks through conventional prewash, power wash and power rinse areas whereupon the racks are transferred automatically to an intermittently running one of the conveyors which carries the racks through a conventional final rinse area and out of the front of the machine onto one of the tables. An automatically operated timing system is provided which turns the prewash and the final rinse on and off, starts and stops the intermittently operated conveyor and operates signals and/or stop means in ac-

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cordance with when the machine can be fed all in properly timed sequence. The timing system is remotely located relative to the conveyors.

In accordance with the above, one feature of this invention resides in the saving of labor cost by the operation by one man standing in front of the machine.

Another feature resides in saving valuable space at both ends of the machine by feeding and unloading from the front.

Still another feature resides in arranging the two tables so that the operator can push dish racks from one of the tables into the machine and so that the machine delivers the dish racks out onto the other table all without need for the operator to lift the racks into and out of the machine.

A further feature resides in the remote location of the timing system. This facilitates locating the system in a dry place.

Another feature resides in the automatic transfer between conveyors and the automatically operated timing system which turns the prewash and the final rinse on and off, starts and stops the intermittently operated conveyor and operates signals and/or stop means in accordance with when the machine should be fed. This produces an automatic, economical, safe, and easily operated machine.

The above and other objects and features of this invention will be appreciated more fully from the following detailed description when read with reference to the accompanying drawings wherein:

FIG. 1 is a perspective view of a dishwashing machine embodying the invention, lower panels being removed to reveal otherwise hidden structure;

FIG. 2 is a fragmentary, horizontal sectional view taken at about the middle of the machine shown in FIG. 1 looking down at the machine;

FIG. 3 is a vertical sectional view taken along the line 3—3 of FIG. 2;

FIG. 4 is a diagrammatic view illustrating the operation of the machine shown in FIG. 1;

FIG. 5 is an enlarged, fragmentary, elevational view of one of the vertical endless conveyor chains shown in FIG. 4;

FIG. 6 is a schematic drawing of an electrical circuit for the automatic control of the machine shown in FIG. 1;

FIG. 7 is a fragmentary view corresponding to the right hand portion of FIG. 2 showing a modified machine;

FIG. 8 is a vertical sectional view taken along the line 8—8 of FIG. 7; and

FIG. 9 is a perspective view of the machine shown in FIG. 1 taken from a different angle illustrating work tables operative in conjunction with the machine.

Referring to the drawings, a conveyor dishwashing machine embodying the invention includes an L-shaped cabinet 10 with an entrance 11 opening from the front in the long leg 12 of the L and an exit 13 also opening from the front in the short leg 14 of the L. The long leg 12 of the L includes, in succession, a pre-wash space 15, a power wash space 16, and a power rinse space 17, and the short leg 14 of the L includes a rinse space 18. Flexible curtains 19 and 20 close the entrance and the exit, respectively. Access to the power wash space 16 and to the power rinse space 17 is obtained through a door 21 in the side of the cabinet 10.

Liquid is supplied to sets of wash spray tubes in the power wash space 16 and to sets of rinse spray tubes in the power rinse space 17 which spray tubes are not shown, but are shown in U.S. Patent No. 2,746,466, issued May 22, 1956 to J. D. Clague and A. W. Haas. Motor driven pumps 22 supply liquid from a wash tank and a rinse tank to the wash tubes and the rinse tubes, respectively, which tanks are not shown, but are shown in the above

patent. This provides a conventional recirculating wash and rinse for the machine. Manually operated start wash button 23 and stop wash button 24 control the wash mechanism. Manually operated start rinse button 25 and stop rinse button 26 control the rinse mechanism. The recirculating power wash and rinse runs continuously during continuous operation of the machine. Because it is a recirculating system, no detergent-containing wash water or hot rinse water is wasted by this procedure. Spraying liquid in the several spaces is prevented from significantly commingling by means of partitions as shown in the above patent.

Fresh hot water from a source outside of the machine is supplied under pressure to rinsing and sanitizing devices in the rinse space 18 which devices are not shown, but are shown in the above patent, such hot rinse water being turned on and off automatically by means of a rinse solenoid 27 (FIG. 6). Fresh water from a source outside of the machine also is supplied to pre-wash devices 200 in the pre-wash space 15 which are shown and described in the above patent, such pre-wash water being turned on and off automatically by means of a pre-wash solenoid 28 (FIG. 6). There is a pre-wash device 200 below and one above articles to be washed when they are in washing position in the machine, only one of the pre-wash devices being seen in FIG. 2. Scraps are disposed of in a heavy duty disposer 29 located below the pre-wash space 15, the disposer being controlled by manually operable start disposer button 30 and stop disposer button 31. The temperatures of the water controlled by the rinse solenoid 27 and the pre-wash solenoid 28 are indicated by thermometers 32 and 33, respectively, atop the cabinet 10. Cabinet panel 34 can be removed to convert the machine from front feed to end feed if so desired. However, the machine will be described as one wherein feeding and unloading are accomplished from the front.

The L-shaped cabinet 10 has its entrance 11 and exit 13 both opening from the front to so complement two dish tables 35 and 36 (FIG. 9) that the path of travel of dishes in racks 37, one of which is shown in FIG. 4, to, through and from the cabinet 10 is in the shape of a U. The L-shaped conveyor dishwashing machine can be operated by one man standing between the tables 35 and 36 in front of the machine. This saves labor cost. Also, such feeding and unloading from the front saves valuable space at both ends of the machine. The table 35 is the soiled dish table; it includes a set down area 38 for soiled dishes, a storage shelf 39 for dish racks, a sink 40, and a work area 41 where the operator standing between the tables loads the cleared articles to be washed into racks and then pushes the racks into the entrance 11. The table 36 is the clean dish table; it includes a work area 42 which receives the dish racks as they are pushed out of the machine, a sorting shelf 43, and a dish soak container 44. The heights of the table work areas 41 and 42 are such that dish racks are fed into the machine from the soiled dish table 35 and out of the machine onto the clean dish table 36 without need for the operator to lift the racks into or out of the machine.

The cabinet 10 supports a threshold channel 45 having its flanges directed downwardly, two transversely extending angles 46 and a longitudinally extending angle 47 which angles are arranged as shown in FIG. 2 to form tracks on which the operator slides the dish racks into the machine. Flat transverse members 48 are supported on an upper edge of the above wash tank and form with the threshold channel 45 and the angles 46 and 47 a rectangularly shaped entrance frame as viewed in FIG. 2 upon which the dish racks are placed when they are first fed into the machine, the end of the angles 46 being spaced from each other to provide room for an idler sprocket 49 and the ends of the members 48 being spaced from each other to provide room for an endless conveyor chain 50. The idler sprocket 49 is mounted for rotation

by means of a shaft 51 journaled in two spaced-apart brackets 52 extending from the respective inner wall of the cabinet 10.

The dish rack tracks provided by the rectangularly shaped entrance frame are extended in the longitudinal direction by means including two channels 53 which have their flanges directed toward the respective cabinet walls and which are supported on the tops of the above rinse and wash tanks. The channels 53 each supports an angle 54 and each channel-angle pair journals a series of rollers 55 in a straight row along a cabinet side and at an elevation such that dish racks pushed from the rectangularly shaped entrance frame to the left as viewed in FIG. 2 are received on the rollers 55 for free movement therealong.

The dish rack tracks provided by the rollers 55 are extended by means of a rectangularly shaped transfer frame 56 which includes two angles 57 supported by the cabinet and extending longitudinally relative to the long cabinet leg 12, an angle 58 supported by the cabinet and extending longitudinally relative to the short cabinet leg 14, two flat members 59 supported atop the above rinse tank and extending longitudinally relative to the short cabinet leg 14, and two flat members 60 one fixed to one of the members 59 and the other fixed to the channel 58 and both extending longitudinally relative to the long cabinet leg 12. The angles 57, members 59 and members 60, respectively, have their ends spaced apart from each other as shown in FIG. 2 for purposes hereinafter described. Dish racks pushed to the left as viewed in FIG. 2 are received upon the transfer frame 56.

The dish rack tracks provided by the transfer frame 56 are extended through the short cabinet leg 14 by means including a series of rollers 61 which are mounted for rotation in the same manner as are the rollers 55, i.e., on suitably supported channels 62 and angles 63. Dish racks pushed into the short cabinet leg 14 from the transfer frame 56 are received on the rollers 61 for free movement therealong. Continued movement of the dish racks causes their discharge onto the clean dish table 36 (FIG. 9).

Two endless conveyor chains at right angles to each other are provided with automatic transfer therebetween. The first chain 50 extends through the long cabinet leg 12 and runs around the idler sprocket 49 and a drive sprocket 64 which is rotatably mounted by means of a shaft 65 journaled in brackets 66 carried by the respective angles 54. The second chain 66 extends through the short cabinet leg 14 and runs around an idler sprocket 67, which is rotatably mounted by means of a shaft 68 journaled in brackets 69 extending from the respective cabinet wall, and a drive sprocket 70, which is rotatably mounted by means of a shaft 71 journaled in brackets 72 extending from the respective cabinet walls. The drive chains 50 and 66 are of conventional construction, one being shown in FIG. 3 as comprising links 73 spaced apart by rollers 74, and are identical, except chain 50 includes 150 pairs of links and chain 66 includes 102 pairs of links. A chain guide 75 is provided for the upper flight of the chain 50 and includes a channel 76, shown in detail in FIG. 3, and a bar 77 (FIG. 3) on which the chain rollers 74 run. The chain guide channel 76 is fixed to the spaced apart ends of the flat members 48, to the spaced apart ends of the flat members 59, and to a similar chain guide channel 78 for the short chain 66, and has an opening 79 to provide clearance for the drive sprocket 64. The chain guide channel 78 is part of a chain guide 80 which is identical in structure and function to the chain guide 75. The chain guide channel 78 is fixed to the idler sprocket brackets 69, to the spaced apart ends of the flat members 60, and to the spaced apart ends of supporting angles 81 extending from the respective cabinet walls. The ends of the angles 57 are spaced apart to provide clearance for the idler sprocket 67.

The long chain 50 includes three pairs of lugs 82, the lugs in each pair being side by side so that three sets of

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lugs are provided. The sets of lugs 82 are spaced equally around the endless chain, i.e., fifty pairs of links 73 separate each set of lugs 82. As viewed in FIG. 2, one set of lugs 82 is shown at the drive sprocket 64 and one set of lugs 82 is shown at the entrance 11, there being another set of lugs 82 directly underneath the set of lugs 82 shown at the entrance 11 and therefore concealed. The short chain 66 includes two pairs of lugs 83, the lugs in each pair being side by side so that two sets of lugs are provided. The sets of lugs 83 are spaced equally around the endless chain 66, i.e., fifty-one pairs of links separate each set of lugs 83. As viewed in FIG. 2, one set of lugs 83 is shown at each of the respective sprockets 67 and 70. A fragment of the long chain 50 is shown in FIG. 5 together with one of its lugs 82 which has a leading cam surface 84 for a purpose hereinafter described. The three sets of lugs 82 and the two sets of lugs 83 are shown in FIG. 4. The lugs 82 and 83 are located as shown in FIG. 3 so that they extend above the chain guide channels 76 and 78 in position to engage the dish racks 37, as shown in FIG. 4, and push them through the machine.

The drive shaft 71 carries a sprocket 85 which is driven by means of a motor 86 through an endless chain 87. The drive shaft 65 carries a sprocket 88 which is driven through a similar endless chain by means of a motor 89. Toggle switch 90 (FIGS. 1 and 6) controls both of the motors 86 and 89.

An automatically operated timing system is provided to turn the prewash solenoid 28 and the rinse solenoid 27 on and off, start and stop the conveyor 66 which is intermittently operated, and operate a red light 91 and a green light 92 in accordance with when the machine can be fed, all in synchronism with the long conveyor chain 50 which is continuously operated, the lights being mounted atop the cabinet 10 for viewing by the operator standing between the tables 35 and 36. The control buttons 23, 24, 25, 26, 30 and 31 and the toggle switch 90 are in easy reach of the operator as he stands between the tables. The timing system includes three double acting switches 93, 94 and 95 for the automatic control of the machine which switches are hereinafter described and as shown in FIG. 4 are located on the outside of the cabinet 10 safe from the dishwasher steam and water.

The timing system further includes a pair of endless slave chains 96 and 97 for operating the remotely located switches 93, 94 and 95. The slave chains 96 and 97 are exactly like the conveyor chains 50 and 66 except that they have fewer links. Slave chain 96 has twenty-five pairs of links and slave chain 97 has fifty-one pairs of links. Slave chain 96 is located on the outside of the cabinet 10 and runs around a suitably mounted idler sprocket 98 (FIG. 4) and a sprocket 99 (FIGS. 2 and 4) on the drive shaft 65. Sprockets 98 and 99 are identical to the sprockets 49 and 64 around which the conveyor chain 50 runs. Slave chain 97 also is located on the outside of the cabinet 10 and runs around a suitably mounted idler sprocket 100 (FIG. 4) and a sprocket 101 (FIGS. 2 and 4) on the drive shaft 71. Sprockets 100 and 101 are identical to the sprockets 67 and 70 around which the conveyor chain 66 runs. Hence, operation of the conveyor chains 50 and 66 causes operation of the respective slave chains 96 and 97, the directions of chain travel being indicated by the arrows in FIG. 4.

The slave chain 96 carries a single lug 102 which is like the lugs 82 and 83 on the conveyor chains. However, whereas the lugs 82 and 83 are arranged in pairs, the lug 102 is a single lug. The double acting switches 93 and 94 are suitably mounted on the outside of the cabinet 10 in position to be operated by the lug 102 when the slave chain 96 moves. Since the sprockets for the slave chain 96 are the same size as the sprockets for the conveyor chain 50 and since the slave chain 96 is like the conveyor chain 50 except for a difference in

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length, the chains 96 and 50 travel at the same linear speed. Since the slave chain 96 has 25 pairs of links and the conveyor chain 50 has 150 pairs of links, the slave chain 96 makes six revolutions for every revolution of the conveyor chain 50. The slave chain 97 carries two single lugs 103 and 104 spaced therealong which are like the slave chain lug 102. The double acting switch 95 is suitably mounted on the outside of the cabinet 10 in position to be operated by the lugs 103 and 104 when the slave chain 97 moves. Since the sprockets for the slave chain 97 are the same size as the sprockets for the conveyor chain 66 and since the slave chain 97 is like the conveyor chain 66 except for a difference in length, the chains 97 and 66 travel at the same linear speed. Since the slave chain 97 has 51 pairs of links and the conveyor chain 66 has 102 pairs of links, the slave chain 97 makes two revolutions for every revolution of the conveyor chain 66. The intermittently operated conveyor chain 66 is run faster than the continuously operated conveyor chain 50 so that the conveyor chain 66 has time to stop and wait for a dish rack 37 to be delivered to it by the conveyor chain 50. The timing system synchronizes the conveyor chains.

A timing control circuit for the machine is shown in FIG. 6. Closing of the toggle switch 90 in a lead 105 causes current to flow through the motor 89 for the long conveyor chain 50 and to flow through the motor 86 for the short conveyor chain 97 provided normally open relay contacts 106 in a lead 107 are closed, the relay contacts 106 being operated by a relay 108 in a lead 109. The toggle switch 90 also is an on and off switch for the rest of the circuit. In one of its operating positions, the double acting switch 93 completes a circuit through a lead 110 to the red light 91 and the prewash solenoid 28 from one side of the power line to the other, and, in the other one of its operating positions, the double acting switch 93 completes a circuit through a lead 111 to the green light 92 from one side of the power line to the other. In one of its operating positions, the double acting switch 94 completes a circuit through the lead 109 to the relays 27 and 108 from one side of the power line to the other, and, in the other one of its operating positions, the double acting switch 94 opens such circuit and comes to rest on a dead terminal 112. In one of its operating positions, the double acting switch 95 completes a circuit through a lead 113 to the solenoids 27 and 108 from one side of the power line to the other, and, in the other one of its operating positions, the double acting switch 95 opens such circuit and comes to rest on a dead terminal 114.

In a first revolution of the slave chain 96, the lug 102 carried by such chain operates the switches 93 and 94 and positions their contacts as shown in FIG. 6, and in a second revolution of the slave chain 96, the lug 102 again operates the switches 93 and 94 but this time moves their contacts to the other positions indicated in FIG. 6. In each revolution of the slave chain 97, the lugs 103 and 104 carried by such chain operate the switch 95 twice to first position its contacts as shown in FIG. 6 and then move its contacts to the other position indicated in FIG. 6.

In operation, the operator feeds racks of dishes from the front of the machine into the entrance 11 and onto the rectangularly shaped entrance frame (angles 46 and 47) where they are engaged by lugs on the continuously running long conveyor chain 50 which pushes them onto and then along the rollers 55 through the long leg 12 of the cabinet 10 and onto the rectangularly shaped transfer frame (angles 57 and 58). Automatic transfer occurs by the short conveyor chain 66 starting up and engaging the racks with its chain lugs and pushing the racks onto and then along the rollers 61 and out of the exit 13. The automatically operated timing system turns the prewash and the final rinse on and off, starts and stops

the short conveyor chain 66 and operates the red and green lights 91 and 92 in accordance with when the machine can be fed.

To start the machine, the operator pushes the start wash button 23, the start rinse button 25 and moves the toggle switch 90 to its closed position shown in FIG. 6. This starts the recirculating wash and rinse which run continuously and motor 89 which drives the long conveyor chain 50 continuously. The apparatus is shown in FIGS. 2 and 4 with the short conveyor 66 in its stopped position wherein it waits for a dish rack, the long conveyor 50 so positioned that none of its lugs 82 are in position to obstruct movement of a rack being pushed into the entrance 11, the slave chain lug 102 in a position such that switch 93 has just been operated to its contact position shown in FIG. 6 (green light 92 on, red light 91 off and prewash solenoid 28 deenergized) and switch 94 is just being operated to its contact position shown in FIG. 6 (solenoids 27 and 108 energized), and the slave chain lug 104 in a position such that switch 95 is just being operated to its contact position shown in FIG. 6. The green light 92 being on is a signal to the operator that he can push a rack into the machine without engaging the side of one of the chain lugs 82 and without getting sprayed with prewash water. A movement of twenty five links of the chain 50 from its position shown in FIGS. 2 and 4 puts a pair of chain lugs 82 in position ready to obstruct movement of a rack into the machine. However, by that time the slave chain 96 has made a complete revolution to reoperate the switch 93 to deenergize the green light 92 and to energize the red light 91 and the prewash solenoid 28. The red light 91 warns the operator not to feed a rack into the machine and the energized prewash solenoid 28 turns the prewash water on. Hence, during each revolution of the conveyor chain 50 there are three equal intervals during which lugs 82 obstruct the entrance 11 and three equal intervals during which lugs 82 do not obstruct the entrance 11, the respective obstructing and non-obstructing intervals following each other in succession. During such single revolution of the conveyor chain 50, the slave chain 96 makes six revolutions to operate the switch 93 six times, i.e., three times to one of its positions and three times to the other of its positions shown in FIG. 6, to turn the green light 92 on and the red light 91 and the prewash solenoid 28 off when the lugs 82 are in non-obstructing position and the green light 92 off and the red light 91 and the prewash solenoid 28 on when the lugs 82 are in obstructing position. Accordingly, the long conveyor chain 50 runs continuously to pick up racks pushed into the entrance 11 and move them to the transfer frame 56, the dishes being sprayed at the entrance 11 by the automatically and intermittently operated prewash and the operator being signaled by the automatically and intermittently operated signal lights when he should or should not feed racks into the entrance 11.

The apparatus is shown in FIGS. 2 and 4 with the short conveyor chain 66 in its stopped position wherein it waits for a dish rack and the long conveyor chain 50 in a position wherein the set of lugs 82 at the sprocket 64 has just pushed a rack onto the transfer frame 56 where automatic transfer from one conveyor chain to the other occurs, a set of lugs 83 on the short conveyor chain 66 being located at the sprocket 67 ready to engage the rack upon the transfer frame 56. During each single revolution of the conveyor chain 50, the slave chain 96 makes six revolutions to operate the switch 93 six times as described above and also to operate the switch 94 six times. In the position of the apparatus as shown in FIGS. 2 and 4, the switch 94 is just being operated to its contact position shown in FIG. 6 (solenoids 27 and 108 energized). Energization of the solenoid 108 causes its normally open contacts 106 to close energizing the motor 86 which runs and drives the short conveyor chain

66 and energization of the solenoid 27 causes final rinse water to spray. Hence, the short conveyor chain 66 is started up three times by every six revolutions of the slave chain 96, i.e., three revolutions of the slave chain 96 causes the contacts of switch 94 to be on the dead terminal 112 and three revolutions of the slave chain 96 causes the contacts of switch 94 to complete the circuit to the solenoids 27 and 108. The set of lugs 83, at the sprocket 67, on the short conveyor chain 66 engages the rack upon the transfer frame 56 when the short conveyor chain 66 moves and pushes the rack out of the exit 13. Switch 94 is used to start the short conveyor chain 66 and the final rinse but not to stop them, switch 95 having the function of stopping the conveyor chain 66 and the final rinse.

Provided the operator is feeding a rack into the machine every time that the green light 92 comes on, the long conveyor chain 50 delivers three racks to the short conveyor chain 66 during each revolution of the long conveyor chain. Every time that a rack is so delivered, as described above, the short conveyor chain 66 and the final rinse are started up by the completion of the circuit to the solenoids 27 and 108. That is, every time that the long conveyor chain 50 completes one third of a revolution the short conveyor chain 66 and the final rinse are started up. However, every time that the long conveyor chain 50 completes one third of a revolution the switch 94 is operated twice by the slave chain lug 102 which attempts to cause the solenoids 27 and 108 to be deenergized before the short conveyor 66 has completed pushing the rack out of the exit 13. Accordingly, switch 95 and its lug operators provided to keep the short conveyor chain 66 going and the rinse solenoid 27 energized until the respective rack has been pushed out of the machine. The short conveyor chain 66 always is stopped with one of its two sets of lugs 83 positioned as shown in FIGS. 2 and 4.

The apparatus is shown in FIGS. 2 and 4 with the slave chain lug 104 in a position such that switch 95 is just being operated to its contact position shown in FIG. 6 (contact of switch 95 on dead terminal 114). When the short conveyor chain 66 starts, the slave chain 97 also starts carrying the lug 103 into engagement with the switch 95 before the operation of switch 94 can stop the short conveyor chain 66 by opening the circuit to the solenoid 108. Operation of the switch 95 moves its contacts to close the circuit through the lead 113 to maintain the circuit to the solenoids 27 and 108 closed after switch 94 opens the circuit to the solenoids 27 and 108 through the lead 109. Shortly thereafter slave chain lug 104 reoperates the switch 95 positioning the contacts of the switch 95 on the dead terminal 114. This causes deenergization of the solenoids 27 and 108 and the final rinse and the short conveyor chain 66 stop. Since the short conveyor chain 66 completes one revolution for every two turns of the slave chain 97 and since the slave chain lug 104 is positioned as shown in FIG. 4 at the switch 95 to stop the short conveyor chain 66 when the chain lugs 83 are at the respective sprockets 67 and 70, the short conveyor chain 66 always stops as shown in FIGS. 2 and 4 with a set of its lugs 83 at the sprocket 67 and waits for the continuously moving conveyor chain 50.

To summarize the automatic timing operation, the continuously moving conveyor chain 50 delivers the racks to the intermittently moving conveyor chain 66. Every time that the long conveyor chain 50 turns once, its slave chain 96 turns six times to operate switches 93 and 94 six times. Six operations of switch 93 turns the green light 92 on and at the same time the red light 91 and the prewash solenoid 28 off three times, and the red light 91 and the prewash solenoid 28 on and at the same time the green light 92 off three times. The green light being on is a signal to the operator that the prewash spray is off and that the chain lugs 82 are in non-obstruct-

ing positions and, hence, that it is time to feed a rack into the entrance 11. Six operations of switch 94 starts the short conveyor 66 and the final rinse three times to take away and finally rinse the dishes in the possible three racks delivered by the long conveyor chain 50 during such single revolution.

Every time that the short conveyor 66 starts its slave chain 97 starts and makes one revolution, the slave chain leg 103 operating the switch 95 to keep the short conveyor chain 66 and the final rinse going after they otherwise would have been stopped by the operation of the switch 94, and the slave chain lug 104 reoperating the switch 95 to stop the short conveyor chain 50 in its position shown in FIG. 4 whereupon the slave chain 97 also stops in its position shown in FIG. 4.

It sometimes happens that the dish racks 37 are a little too large to fit in the transfer frame 56 or the dish racks 37 are moved into such frame in a cocked position. In order to prevent a jam up of the long conveyor chain 50 in such situations, the leading edges 84 (FIG. 5) of the lugs 82 are cam-shaped so that the lugs 82 lift the racks up enough to leave room for such lugs to escape as they move downwardly around the drive sprocket 64.

A modified machine is shown in FIGS. 7 and 8. Reference numbers in FIGS. 7 and 8 which are similar to numbers in FIGS. 1-6 refer to parts alike in structure and function. The threshold channel 45a is provided with a hole 115 which receives a ring-shaped gasket 116 which in turn receives a plunger 117 of a solenoid 118 that is carried by a bracket 119 fixed to the threshold channel 45a. The solenoid 118 is wired into the lead 110 (FIG. 6) in place of the red light 91 or it is wired into the lead 110 in series with the red light 91. The circuit shown in FIG. 6 then functions as hereinbefore described except that, in the case where the solenoid 118 is substituted for the red light 91, completion of the circuit through the lead 110 instead of lighting the red light 91 to warn the operator energizes the solenoid 118 which moves its plunger 117 into its broken line position shown in FIG. 8 to prevent the operator from pushing a dish rack into the entrance of the machine, i.e., a lock or stop means is provided in place of a signal light, and in the case where the solenoid 118 is placed in series with the red light 91, completion of the circuit through the lead 110 instead of just lighting the red light 91 energizes both the red light 91 and the solenoid 118 to both warn the operator and prevent the operator from pushing a dish rack into the entrance of the machine, i.e., both a lock or stop means and a signal light are provided.

It is to be understood that the above description is illustrative of this invention and that various modifications thereof can be utilized without departing from its spirit and scope.

Having described the invention, we claim:

1. A conveyor dishwashing machine comprising, in combination, an L-shaped cabinet defining a wash space and having two joining legs the first of which defines an entrance and the second of which defines an exit at the ends of the respective legs, an entrance frame within the wash space at the entrance upon which dish racks are placed, spray means within the wash space for spraying liquid onto articles in the dish racks, a transfer frame at the junction of the legs, track means between the frames and between the transfer frame and the exit, the frames and the track means being so arranged that dish racks can be moved from the entrance frame along the respective track means to the transfer frame and from

the transfer frame along the respective track means to the exit, conveyor means one in each leg of the L for moving dish racks through the leg of the L defining the entrance continuously and for moving dish racks through the other leg of the L intermittently, the conveyor means comprising lug means for moving racks placed upon the entrance frame along the respective track means to the transfer frame and from the transfer frame along the respective track means to the exit, signal means, spray operating means for turning the spray means on and off, and control means for keeping the conveyor means synchronized and for automatically operating the signal means and the spray operating means in accordance with the position of the lug means of the continuously operable conveyor means relative to the entrance.

2. A conveyor dishwashing machine according to claim 1 wherein the entrance and the exit both open from the front and tables are so juxtaposed to the entrance and the exit that the path of travel of the racks to, through and from the cabinet is in the shape of a U.

3. A conveyor dishwashing machine comprising, in combination, an L-shaped cabinet defining a wash space and having two joining legs the first of which defines an entrance and the second of which defines an exit at the ends of the respective legs, an entrance frame within the wash space at the entrance upon which dish racks are placed, spray means within the wash space for spraying liquid onto articles in the dish racks, a transfer frame at the junction of the legs, track means between the frames and between the transfer frame and the exit, the frames and the track means being so arranged that dish racks can be moved from the entrance frame along the respective track means to the transfer frame and from the transfer frame along the respective track means to the exit, conveyor means one in each leg of the L for moving dish racks through the leg of the L defining the entrance continuously and for moving dish racks through the other leg of the L intermittently, the conveyor means comprising lug means for moving racks placed upon the entrance frame along the respective track means to the transfer frame and from the transfer frame along the respective track means to the exit, stop means for obstructing the entrance when the lug means of the continuously operable conveyor means obstructs transverse movement of racks on the entrance frame, spray operating means for turning the spray means on and off, and control means for keeping the conveyor means synchronized and for automatically operating the stop means and the spray operating means in accordance with the position of the lug means of the continuously operable conveyor means relative to the entrance.

4. A conveyor dishwashing machine according to claim 3 wherein the entrance and the exit both open from the front and tables are so juxtaposed to the entrance and the exit that the path of travel of the racks to, through and from the cabinet is in the shape of a U.

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